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| 10/681,374 | 10/09/2003 | Andre Arsenault | 14473 | 6378 |

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| EXAMINER | |
|---|---|
| KUGEL, TIMOTHY J | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 1712 | |

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/681,374 | ARSENAULT ET AL. | |
| | Examiner | Art Unit | |
| | Timothy J. Kugel | 1712 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *04 April 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-88* is/are pending in the application.

4a) Of the above claim(s) *30-51* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-29 and 52-88* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☒ Claim(s) *1-88* are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 October 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *04/01/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

1. Claims 1-29 and 52-88 are pending as amended on 12 January 2007. Claims 30-51 have been withdrawn.

### *Election/Restrictions*

2. Applicant's election without traverse of the invention of Group I in the reply filed on 22 August 2006 is acknowledged.

Claims 30-51 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim.

3. Regarding the election of species requirements: upon further consideration the search of each of the species would not constitute a serious burden, therefore the election of species have been withdrawn.

### *Information Disclosure Statement*

4. The information disclosure statement submitted on 1 April 2004 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the examiner has considered the information disclosure statement.

***Drawings***

5. The drawings are objected to because Figures 2, 8, 14, 15 and 16 reproduce as little more than black rectangles with little, if any, detail. Further, Figures 1B and 3-6, are partially obscured by a background pattern and are generally of poor quality.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application.

Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d).

If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### *Specification*

6. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

### *Claim Objections*

7. A series of singular dependent claims is permissible in which a dependent claim refers to a preceding claim which, in turn, refers to another preceding claim.

A claim that depends from a dependent claim should not be separated by any claim that does not also depend from said dependent claim. It should be kept in mind that a dependent claim may refer to any preceding independent claim. In general, applicant's sequence will not be changed. See MPEP § 608.01(n).

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the second paragraph of 35 USC 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 28, 29 and 86 are rejected under 35 USC 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 28 and 86 each recites the limitation "A wavelength tunable composite material according to claim 1 wherein the substrate..." There is insufficient antecedent

basis for this limitation in the claim. For the purpose of examination, claims 28 and 86 were each construed to recite, "A wavelength tunable composite material according to claim [[1]] 87 wherein the substrate..."

Regarding claim 29, the inclusion of a term within parentheses renders the claim indefinite because it is unclear whether the included term is part of the claimed invention. For the purpose of examination, claim 29 was construed to not recite the parenthetical limitation.

***Claim Rejections - 35 USC § 102 and/or 35 USC § 103***

The following is a quotation of the appropriate paragraphs of 35 USC 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

9. Claims 1-27, 29, 52-83 and 86-88 are rejected under 35 USC 102(a) as being anticipated by or, in the alternative, under 35 USC 103(a) as being unpatentable over Galloro et al., *Replicating the Structure or a Crosslinked Polyferrocenylsilane Inverse Opal in the Form of a Magnetic Ceramic, Advanced Functional Materials*, May 2002, 12, No. 5, pp 382-388 (Galloro hereinafter).

Galloro teaches a tunable photonic bandgap material (Page 382 ¶3) comprising self-assembled monodisperse microspheres (Page 382 ¶2) of polystyrene, polystyrene-iron composites (Page 382 ¶3) or silica—including silica that has been sintered to provide slight points of contact between the spheres—(Page 383 ¶3) with diameters of 480 ± 11 nm (Figures 1 and 3 and Page 386 ¶5) having a face centered cubic lattice (Page 383 ¶4) in a matrix of crosslinked polyferrocenylsilanes—including spirocyclic 1-silaferrocenophanes—(Abstract and Page 382 ¶4 – Page 383 ¶2) wherein the microspheres and the polyferrocenylsilanes have different refractive indexes (Table 1 and Page 384 ¶3) and exhibit Bragg's Law diffraction (Page 384 ¶4). Galloro further teaches that the silica particles may be etched away with an aqueous HF solution to leave behind voids; such voids would be filled, presumably with nitrogen during pyrolysis (Page 383 ¶3).

If there is any difference between the product of Galloro and the product of the instant claims the difference would have been minor and obvious.

Claims 11, 14, 23-26, 28, 52-82, 86 and 87 are viewed as product-by-process claims and hence the methods they are created by are not pertinent, unless applicant can show a different product is produced. Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964,

966 (Fed. Cir. 1985). "There is nothing inconsistent in concurrent rejections for obviousness under 35 USC 103 and for anticipation under 35 USC 102." *In re Best*, 562 F.2d 1252, 1255 n.4, 195 USPQ 430, 433 n.4 (CCPA 1977).

Since Galloro teaches the same composition as claimed, the expanding, contracting, fluid uptake and expulsion behavior, electronic configuration, porosity and the chemical, physical, electrochemical, optical and electronic properties of the Galloro composition would inherently be the same as claimed.

Where applicant claims a composition in terms of a function, property or characteristic and the composition of the prior art is the same as that of the claim but the function is not explicitly disclosed by the reference, the examiner may make a rejection under both 35 USC 102 and 103 (MPEP 2112 III).

10. Claims 1-26, 29, 52-82 and 88 are rejected under 35 USC § 103(a) as being unpatentable over International Patent Application Publication WO 01/18283 (Amos hereinafter) in view of Kulbaba et al., *Organometallic Gels: Characterization and Electrochemical Studies of Swellable, Thermally Crosslinked Poly(ferrocenylsilane)s*, Macromolecular Chemistry and Physics, June 2001, 202, No. 9, pp 1768-1776 (Kulbaba hereinafter). US Patent 6,797,057 is the US equivalent to Amos; all references herein are taken therefrom.

Amos teaches colloidal photonic crystals having face-centered-cubic structure (Abstract, Column 1 Lines 6-8 and 24-32) comprising monosized polymer colloidal spheres (Column 1 Lines 33-41)—which includes silica and polymethylmethacrylate

with a radius of 0.01 μm to 100 μm (Column 3 Lines 4-34)—dispersed in a medium that can be changed from a liquid to a solid in order to fix the colloidal crystalline structure (Column 2 Lines 49-51), preferably one of a polymer or resin (Column 3 Lines 15-17) wherein the refractive index of the dispersion medium may be substantially different from the refractive index of the colloidal spheres (Column 3 Lines 59-63) and wherein the matrix may be removed and the resulting voids be replaced by a gas such as air (Column 7 Lines 5-14) or the polymer colloidal spheres may be removed by dissolving in a suitable solvent (Column 9 Line 65 – Column 10 Line 6).

Amos does not disclose expressly the crosslinked metallopolymer as instantly claimed.

Kulbaba discloses crosslinked swellable poly(ferrocenylsilane)s including dimethyl spirocyclic-1-ferrocenophane for use as a stimuli-response gel (Page 1768 ¶4 – Page 1769 ¶1).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to include the crosslinked swellable poly(ferrocenylsilane)s including dimethyl spirocyclic-1-ferrocenophane taught by Kulbaba as the matrix polymer in the colloidal photonic crystals of Amos. The motivation to do so would have been that the polymer network of Kulbaba can absorb large amounts of solvent without dissolving and may undergo rapid continuous or discrete volume changes in response to variations in its environment (Kulbaba Page 1768 ¶1).

Since Kulbaba and Amos combine to teach the same composition as claimed, one of ordinary skill in the art at the time the invention was made would have

understood the expanding, contracting, fluid uptake and expulsion behavior, electronic configuration, porosity and the chemical, physical, electrochemical, optical and electronic properties of the Amos/Kulbaba composition would intrinsically be the same as instantly claimed.

11. Claims 1, 28, 86 and 87 are rejected under 35 USC § 103(a) as being unpatentable over US Patent Application Publication 2002/00627782 (Norris hereinafter) in view of Kulbaba.

Norris teaches a semiconductor wafer comprising a photonic crystal (¶0002) wherein the photonic crystal comprises an ordered array of sintered silica spheres in a polymer matrix are built in layers onto a cleaned silicon wafer (¶0005 and Example 1 ¶¶0061-0074).

Norris does not disclose expressly the crosslinked metallopolymer as instantly claimed.

Kulbaba discloses crosslinked swellable poly(ferrocenylsilane)s including dimethyl spirocyclic-1-ferrocenophane for use as a stimuli-response gel (Page 1768 ¶4 – Page 1769 ¶1).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to include the crosslinked swellable poly(ferrocenylsilane)s including dimethyl spirocyclic-1-ferrocenophane taught by Kulbaba as the matrix polymer in the colloidal photonic crystals of Norris. The motivation to do so would have been that the polymer network of Kulbaba can absorb large amounts of solvent without dissolving and

may undergo rapid continuous or discrete volume changes in response to variations in its environment (Kulbaba Page 1768 ¶1).

Since Kulbaba and Norris combine to teach the same composition as claimed, one of ordinary skill in the art at the time the invention was made would have understood the expanding, contracting, fluid uptake and expulsion behavior, electronic configuration, porosity and the chemical, physical, electrochemical, optical and electronic properties of the Norris/Kulbaba composition would intrinsically be the same as instantly claimed.

12. Claims 84 and 85 are rejected under 35 USC § 103(a) as being unpatentable over Amos in view of Kulbaba as applied to claims 1-26, 29, 52-82 and 88 above in further view of US Patent 4,351,929 (Nelson hereinafter) or US Patent 4,919,865 (Gibbs hereinafter).

Amos and Gibbs combine to teach colloidal photonic crystals having face-centered-cubic structure comprising monosized polymer colloidal spheres—which includes silica and polymethylmethacrylate with a radius of 0.01 μm to 100 μm—dispersed in a medium including a crosslinked swellable poly(ferrocenylsilane)s including dimethyl spirocyclic-1-ferrocenophane wherein the refractive index of the dispersion medium may be substantially different from the refractive index of the colloidal spheres and wherein or the matrix may be removed and the resulting voids be replaced by a gas such as air or the polymer colloidal spheres may be removed by dissolving in a suitable solvent.

Since Kulbaba and Amos combine to teach the same composition as claimed, one of ordinary skill in the art at the time the invention was made would have understood the expanding, contracting, fluid uptake and expulsion behavior, electronic configuration, porosity and the chemical, physical, electrochemical, optical and electronic properties of the Amos/Kulbaba composition would intrinsically be the same as instantly claimed.

Amos and Kulbaba do not disclose expressly toluene, tetrahydrofuran or acetone being used as a solvent for the polymethylmethacrylate particles.

Nelson discloses that both toluene and acetone are suitable solvents for polymethylmethacrylate (Column 6 Lines 36-43) and Gibbs discloses that both tetrahydrofuran and toluene are suitable solvents for polymethylmethacrylate (Abstract and Column 1 Lines 18-29)

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use the toluene or acetone solvents of Nelson or the tetrahydrofuran or toluene solvents of Gibbs to dissolve the polymethylmethacrylate particles of the composition of Amos and Kulbaba since it has been held that it is *prima facie* obviousness to use a known material based on its suitability for its intended use (*Sinclair & Carroll Co. v. Interchemical Corp.*, 325 US 327, 65 USPQ 297 (1945), *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960) and *Ryco, Inc. v. Ag-Bag Corp.*, 857 F.2d 1418, 8 USPQ2d 1323 (Fed. Cir. 1988)).

***Conclusion***

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Arsenault et al., *A Polychromic, Fast Response Metallopolymer Gel Photonic Crystal with Solvent and Redox Tunabilibty: A Step Toward Photonic Ink (P-Ink)*, Advanced Materials, March 17, 2003, 15, No. 6 (Arsenault hereinafter) is cited on the International Search Report for PCT/CA03/01512 as a P,X reference; however, the publishing date of 17 March 2003 disqualifies Arsenault as prior art based on the filing date of Provisional Application 60/416,910 from which the instant application claims priority.

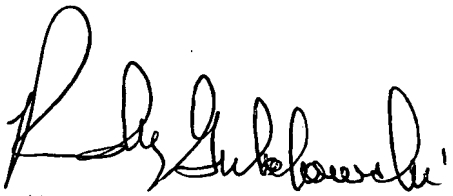
14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Timothy J. Kugel whose telephone number is (571) 272-1460. The examiner can normally be reached 6:00 AM – 4:30 PM Monday - Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski can be reached on (571) 272-1302. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

15. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TJK
Art Unit 1712



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